

ABSTRACT

A method that comprises providing a polymerized sol-gel material (PSG) and linking an enzyme to a surface of the PSG via covalent linkage is provided. The surface of the PSG is derivatized with a linker that comprises a functional group for linking itself to the surface of the PSG and a functional group for linking itself with ~~then~~ the enzyme. The linked-enzyme PSG, or microreactor, is an effective means of at least partially digesting a substrate, such as a biological substrate. The activity of the enzyme of the microreactor may be significantly enhanced, up to 200-fold for example, relative to the activity of the enzyme free of the microreactor. The microreactor is thus an effective vehicle for digesting a substrate such as a biomolecule, a protein, an oligonucleotide, a peptide, a steroid, and/or an organic acid, after which, any remaining substrate and one or more digestion product(s) may be separated and detected. Microreactors and integrated devices that incorporate microreactors, such as columns, pipet tips, wells, and well-plates, are also provided.